

WHAT IS CLAIMED IS:

1                   1.    An isolated nucleic acid comprising a polynucleotide sequence  
2    associated with the senescence of a cell, said polynucleotide sequence encoding a protein  
3    that specifically binds to antibodies raised against a protein encoded by SEQ ID NO:1.

2. The isolated nucleic acid of claim 1 wherein the sequence has at least 85% sequence identity with SEQ ID NO:1.

1                    3.    The isolated nucleic acid of claim 1 wherein the sequence has at least  
2    95% sequence identity with SEQ ID NO:1.

1 4. An isolated protein which is encoded by the nucleic acid of claim 1.

1                    5.    An antibody which selectively binds to the protein of claim 4.

6. An isolated nucleic acid comprising a polynucleotide sequence associated with the senescence of a cell, said polynucleotide sequence being at least about 80% identical to a nucleic acid sequence as set forth in SEQ. ID. NO. 1 over a region at least about 32 nucleotides in length when compared using the BLASTN algorithm with a Wordlength (W) of 11, M=5, Cutoff=100 and N=-4.

1 ~~7. An isolated nucleic acid comprising a polynucleotide sequence~~  
2 ~~associated with the senescence of a cell, wherein said polynucleotide sequence hybridizes to~~  
3 ~~a nucleic acid having a sequence as set forth in SEQ ID NO. 1 under stringent conditions.~~

1                    8.    An isolated nucleic acid comprising a polynucleotide sequence  
2    associated with G<sub>0</sub>-arrested cells, said polynucleotide sequence encoding a protein that  
3    specifically binds to antibodies raised against a protein encoded by SEQ ID NO:2.

9. The isolated nucleic acid of claim 8 wherein the sequence has at least 85% sequence identity with SEQ ID NO:2.

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amplification primers and nucleic acid probes which selectively bind to said protein.



24. The method of claim 23 wherein said probe comprises at least about 10 nucleotides from a polynucleotide sequence selected from the group consisting of SEQ. ID. NOS: 41-46, 123, 127, 135-139, 140 and 142-146. ~~NOS: 42-49, 134-138, 153-157 and 168-170.~~

25. A method for detecting whether a cell is undergoing senescence, said method comprising:  
contacting RNA from said cell with a probe which comprises a polynucleotide sequence associated with senescence; and  
determining whether the amount of said probe which hybridizes to the RNA is increased or decrease relative to the amount of said probe which hybridizes to RNA from a non-senescent cell.

26. The method of claim 25 wherein said probe comprises at least about 10 nucleotides from a polynucleotide sequence selected from the group consisting of SEQ. ID. NOS: 2, 37-140, 142 and 144-147. ~~NOS: 2, 38-157 and 168-175.~~

27. The method of claim 25 wherein the senescence is associated with progeria.

28. The method of claim 25 wherein the senescence is associated with Werner syndrome.

29. A kit for detecting whether a cell is undergoing senescence, said kit comprising:

a probe which comprises a polynucleotide sequence associated with senescence; and

a label for detecting the presence of said probe.

30. The kit in accordance with claim 29 wherein said probe comprises at least about 10 nucleotides from a polynucleotide sequence selected from the group consisting of SEQ. ID. NOS: 2, 37-140, 142 and 144-147. ~~NOS: 2, 38-157 and 168-175.~~

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~~The kit includes a label for each component which comprises a label for the component and a label for the component's function.~~

32. The kit in accordance with claim 31 wherein said probes are

33. The kit in accordance with claim 29 wherein said solid support is a chip.

34. A method for identifying a modulator of a G<sub>0</sub>-arrested cell, said method

culturing said cell in the presence of said modulator to form a first cell

contacting RNA from said first cell culture with a probe which

determining whether the amount of said probe which hybridizes to the

35. The method of claim 34 wherein said probe comprising at least about 10

NO: 1 SEQ ID NO: 3  
~~NO: 1 and SEQ. ID. NO: 3.~~

36. The method of claim 35 wherein said polynucleotide sequence is

~~SEQ ID NO:1~~      ~~SEQ ID NO:3~~  
~~SEQ. ID. NO.:1 and SEQ. ID. NO.:3.~~

37. A method for detecting whether a cell is G<sub>0</sub>-arrested, said method

contacting RNA from said cell with a probe which comprises a

determining whether the amount of said probe which hybridizes to the RNA is increased or decrease relative to the amount of said probe which hybridizes to RNA from a non-G<sub>0</sub>-arrested cell.

38. A kit for detecting whether a cell is G<sub>0</sub>-arrested, said kit comprising:  
a probe which comprises a polynucleotide sequence associated with  
G<sub>0</sub>-arrested cells; and  
a label for detecting the presence of said probe.

39. The kit in accordance with claim 38 wherein said probe comprises at least about 10 nucleotides from a polynucleotide sequence selected from the group consisting of ~~SEQ. ID. NO. 1 and SEQ. ID. NO. 3~~ <sup>SEQ ID NO: 1 AND SEQ ID NO: 3</sup>.

40. A method for identifying a modulator of cyclin A, said method comprising:  
culturing a cell in the presence of said modulator to form a first cell culture;  
contacting RNA from said first cell culture with a probe which comprises a polynucleotide sequence associated with cyclin A; and  
determining whether the amount of said probe which hybridizes to the RNA from said first cell culture is increased or decrease relative to the amount of said probe which hybridizes to RNA from a second cell culture grown in the absence of said modulator.

41. The method of claim 40 wherein said probe comprises at least about 10 nucleotides from a polynucleotide sequence selected from the group consisting of ~~SEQ. ID. NOS: 31-36~~ <sup>SEQ ID</sup> ~~NOS: 32-37.~~

42. The method of claim 41 wherein said polynucleotide sequence is substantially identical to a polynucleotide sequence selected from the group consisting of ~~SEQ ID NOS: 31-36~~ <sup>SEQ ID</sup> ~~SEQ. ID. NOS: 32-37.~~

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1 43. A method for modulating cell senescence in a patient in need thereof,  
2 said method comprising administering to said patient a compound that modulates the  
3 senescence of a cell.

1 44. The method of claim 43 wherein said compound increases or decreases  
2 the expression level of a nucleic acid associated with senescence.

1 45. The method of claim 44 wherein said nucleic acid comprises at least  
2 about 10 nucleotides from a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ. ID NOS. 2, 37-140, 142 and 144-147~~  
~~SEQ. ID NOS. 2, 38-157 and 168-175.~~

1 46. The method of claim 44 wherein said nucleic acid sequence is  
2 substantially identical to a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ. ID NOS. 2, 37-140, 142 and 144-147~~  
~~SEQ. ID NOS. 2, 38-157 and 168-175.~~

1 47. The method of claim 44 wherein said senescence is associated with  
2 progeria.

1 48. The method of claim 47 wherein said nucleic acid comprising at least  
2 about 10 nucleotides from a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ. ID NOS. 2, 37-140, 142 and 144-147~~  
~~SEQ. ID NOS. 2, 38-41, 139-152 and 171-173.~~

1 49. The method of claim 44 wherein said senescence is associated with  
2 Werner syndrome.

1 50. The method of claim 49 wherein said nucleic acid comprising at least  
2 about 10 nucleotides from a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ. ID NOS. 41-48, 123-127, 135, 138, 140 and 144-146~~  
~~SEQ. ID NOS. 42-49, 134-138, 153-157, 168-170.~~

1 51. The method of claim 44 wherein said compound is an antisense  
2 molecule.

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1 52. The method of claim 44 wherein said compound is a ribozyme.

1 53. A method for detecting whether a fibroblast cell is aging, said method  
2 comprising:

3 contacting RNA from said fibroblast cell with a probe which comprises  
4 a polynucleotide sequence associated with senescence; and  
5 determining whether the amount of said probe which hybridizes to the  
6 RNA is increased or decrease relative to the amount of said probe which hybridizes to RNA  
7 from a non-aging fibroblast cell.

1 54. The method of claim 53 wherein said probe comprising at least about 10  
2 nucleotides from a polynucleotide sequence selected from the group consisting of <sup>SEQ ID</sup>  
3 ~~NOS: 47, 83, 88, 138, 139, 141, 142, 145 and 146.~~ ~~SEQ ID~~  
~~NOS: 158-164 and 176-178.~~

1 55. A kit for detecting whether a fibroblast cell is aging, said kit  
2 comprising:  
3 a probe which comprises a polynucleotide sequence associated with  
4 senescence; and  
5 a label for detecting the presence of said probe.

1 56. The kit in accordance with claim 55 wherein said probe comprises at  
2 least about 10 nucleotides from a polynucleotide sequence selected from the group  
3 consisting of <sup>SEQ ID</sup> ~~NOS: 47, 83, 88, 138, 139, 141, 142, 145 and 146.~~ ~~SEQ ID~~  
~~NOS: 158-164 and 176-178.~~

1 57. A method for modulating the aging of a fibroblast cell in a patient in  
2 need thereof, said method comprising administering to said patient a compound that  
3 modulates the aging of said fibroblast cell.

1 58. The method of claim 57 wherein said compound increases or decreases  
2 the expression level of a nucleic acid associated with the aging of fibroblast cells.

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1 59. The method of claim 65 wherein said nucleic acid comprises at least  
 2 about 10 nucleotides from a polynucleotide sequence selected from the group consisting of  
 3 ~~SEQ. ID NOS: 47, 83, 88, 138, 139, 141, 142, 145 and 146~~  
~~SEQ. ID NOS: 158-164 and 176-178.~~

1 60. A method for detecting whether a skin cell is aging, said method  
 2 comprising:  
 3 contacting RNA from said skin cell with a probe which comprises a  
 4 polynucleotide sequence associated with senescence; and  
 5 determining whether the amount of said probe which hybridizes to the  
 6 RNA is increased or decrease relative to the amount of said probe which hybridizes to RNA  
 7 from a non-aging skin cell.

1 61. The method of claim 60 wherein said probe comprising at least about 10  
 2 nucleotides from a polynucleotide sequence selected from the group consisting of ~~SEQ. ID~~  
 3 ~~NOS: 47, 83 and 143~~  
~~NOS: 165-167 and 179.~~

1 62. A kit for detecting whether a skin cell is aging, said kit comprising:  
 2 a probe which comprises a polynucleotide sequence associated with  
 3 senescence; and  
 4 a label for detecting the presence of said probe.

1 63. The kit in accordance with claim 62 wherein said probe comprises at  
 2 least about 10 nucleotides from a polynucleotide sequence selected from the group  
 3 consisting of ~~SEQ. ID NOS: 47, 83 and 143~~  
~~SEQ. ID NOS: 165-167 and 179.~~

1 64. A method for modulating the aging of a skin cell in a patient in need  
 2 thereof, said method comprising administering to said patient a compound that modulates the  
 3 aging of said cell.

1 65. The method of claim 64 wherein said compound increases or decreases  
 2 the expression level of a nucleic acid associated with the aging of skin cells.

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1                   66. The method of claim 65 wherein said nucleic acid comprises at least  
2 about 10 nucleotides from a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ. ID NOS: 47, 83 And 143~~  
~~SEQ. ID NOS: 165-167 and 169.~~

1                   67. A method for identifying a modulator of a young cell, said method  
2 comprising:  
3                   culturing said cell in the presence of said modulator to form a first cell  
4 culture;  
5                   contacting RNA from said first cell culture with a probe which  
6 comprises a polynucleotide sequence associated with young cells; and  
7                   determining whether the amount of said probe which hybridizes to the  
8 RNA from said first cell culture is increased or decrease relative to the amount of said probe  
9 which hybridizes to RNA from a second cell culture grown in the absence of said modulator.

1                   68. The method of claim 67 wherein said probe comprising at least about 10  
2 nucleotides from a polynucleotide sequence selected from the group consisting of ~~SEQ. ID~~  
3 ~~NOS: 4-30, 50, 60, 63, 71, 74, 80, 87, 94, 122 And 123~~  
~~NOS: 4-31 and 124-133.~~

1                   69. The method of claim 67 wherein said polynucleotide sequences is  
2 substantially identical to a polynucleotide sequence selected from the group consisting of  
3 ~~SEQ ID NOS 4-30, 50, 60, 63, 71, 74, 80, 87, 94, 122 + 123.~~  
~~SEQ. ID. NOS: 4-31 and 124-133.~~

1                   70. A method for detecting whether a cell is young, said method  
2 comprising:  
3                   contacting RNA from said cell with a probe which comprises a  
4 polynucleotide sequence associated with young cells; and  
5                   determining whether the amount of said probe which hybridizes to the  
6 RNA is increased or decrease relative to the amount of said probe which hybridizes to RNA  
7 from a non-young cell.

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nucleotides from a polynucleotide sequence selected from the group consisting of SEQ. ID. NOS 4-34, 50, 60, 63, 71, 74, 80, 87, 94, 122 And 123.

72. A method for detecting in a test sample the presence or absence of a mutation in a nucleotide sequence essentially encoding human senescent protein comprising;

- contacting said test sample suspected of containing a gene encoding a mutant form of the human senescent protein with a first oligonucleotide having a sequence competent to discriminate between the wild type gene and the mutant form; and,
- detecting the formation of a duplex between the gene and the first oligonucleotide sequence.